WHAT IS CLAIMED IS:

1. A process for detecting a target single-stranded nucleic acid having a first base sequence, said process comprising the steps of:

forming a double-stranded nucleic acid by hybridizing said target single-stranded nucleic acid with a probe nucleic acid having a second base sequence complementary to said first base sequence;

providing a chemiluminescent compound capable of being associated with a double-stranded nucleic acid, and then associating said chemiluminescent compound with the double-stranded nucleic acid resulting from said forming step; and

detecting luminescence from said chemiluminescent compound associated with said double-stranded nucleic acid.

2. The process according to Claim 1, wherein the luminescence-detecting step is conducted under a condition that only said chemiluminescent compound associated with said double-stranded nucleic acid can exhibit chemiluminescence.

3. The process according to Claim 2, wherein said condition is in an aqueous medium in which said chemiluminescent compound non-associated with a double-

stranded nucleic acid does not exhibit chemiluminescence.

4. The process according to Claim 3, wherein said aqueous medium is water.

5. The process according to Claim 3, wherein said aqueous medium is an aqueous buffer solution.

6. The process according to Claim 3, wherein said aqueous medium is a mixture solution of water and an organic solvent miscible with water.

7. The process according to Claim 6, wherein said organic solvent comprises at least one solvent selected from the group consisting of methanol, ethanol, acetonitrile, dimethylformamide, dimethylsulfoxide, and isopropanol.

8. The process according to Claim 6, wherein said mixture solution has a content of said organic solvent falling within 2 to 50% by volume relative to water.

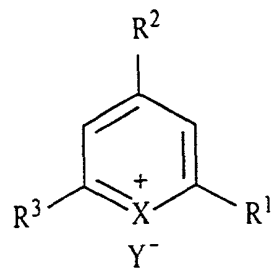
9. The process according to Claim 8, wherein said content falls within 5 to 20% by volume relative to water.

10. The process according to Claim 3, wherein pH of

said aqueous medium ranges from 5 to 8.

11. The process according to Claim 1, wherein said chemiluminescent compound is capable of being inserted into the double helical structure of said double-stranded nucleic acid as an intercalator.

12. The process according to Claim 11, wherein said chemiluminescent compound is a pyrylium compound represented by the following formula [1]:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or unsubstituted aryl group;

the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of

L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene group, or $-CH=R^4-$, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or $-CH=R^5$, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

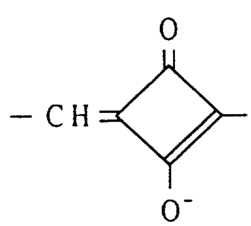
Y^- is an anion.

13. The process according to Claim 12, wherein L in said formula [1] is any one of the groups represented by the following formulae [2] to [6], respectively:

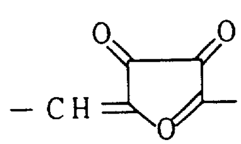
$$\begin{array}{l} -CH=\underset{\displaystyle Z}{\underset{|}{C}}-(CH=CH)n- \end{array} \qquad [2];$$

$$-\phi-(CH=CH)n- \qquad [3];$$

$$-CH=CH-\phi-CH=CH- \qquad [4];$$



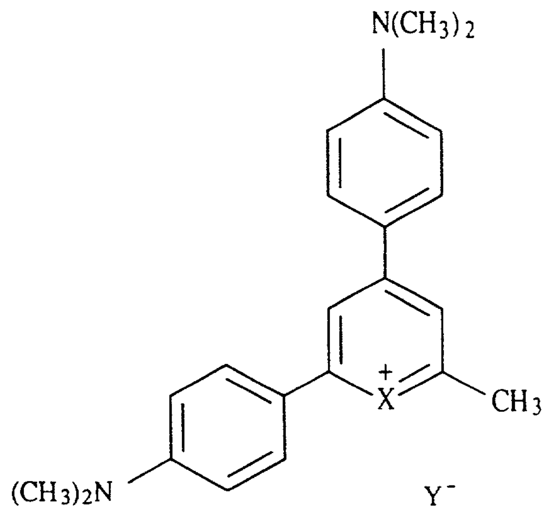
[5]; and



[6],

wherein Z is a hydrogen atom or a substituted or unsubstituted lower alkyl group, n is 0, 1 or 2, and ϕ is a substituted or unsubstituted o-, m- or p-phenylene group.

14. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [7]:

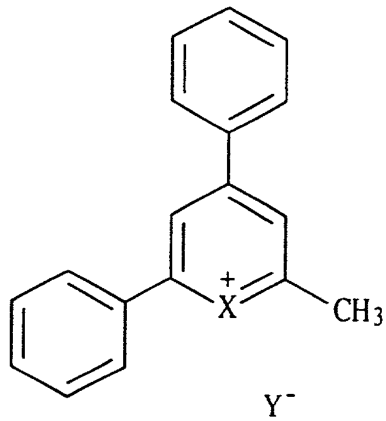


[7],

wherein X is O, S, Se, or Te, and Y^- is an anion.

15. The process according to Claim 14, wherein X is O or S, and Y is I or ClO_4.

16. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [8]:

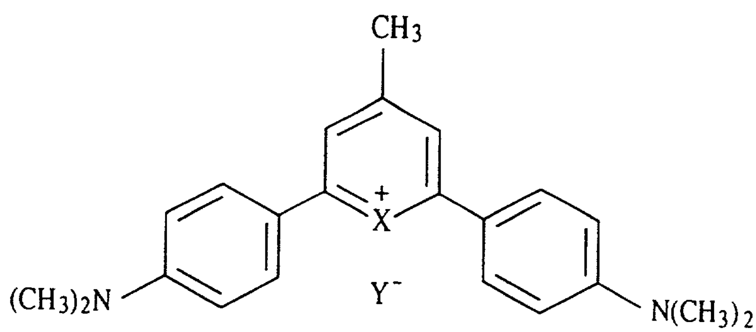


[8],

wherein X is O, S, Se, or Te, and Y- is an anion.

17. The process according to Claim 16, wherein X is O or S, and Y is I or ClO_4.

18. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [9]:



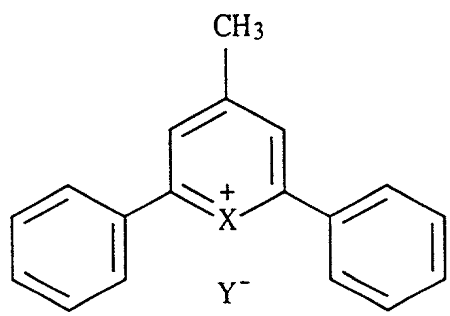
[9],

wherein X is O, S, Se, or Te, and Y- is an anion.

19. The process according to Claim 18, wherein X is O

or S, and Y is I or ClO_4.

20. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [10]:

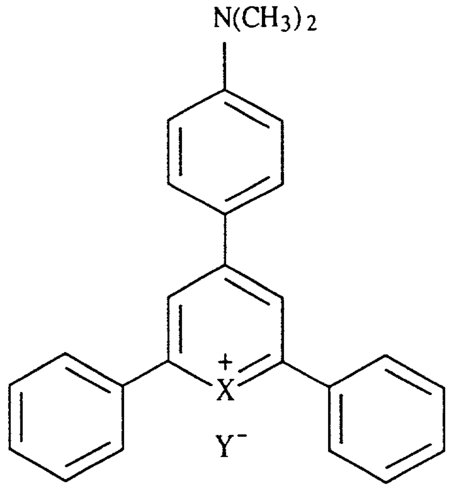


[10],

wherein X is O, S, Se, or Te, and Y^- is an anion.

21. The process according to Claim 20, wherein X is O or S, and Y is I or ClO_4.

22. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [11]:

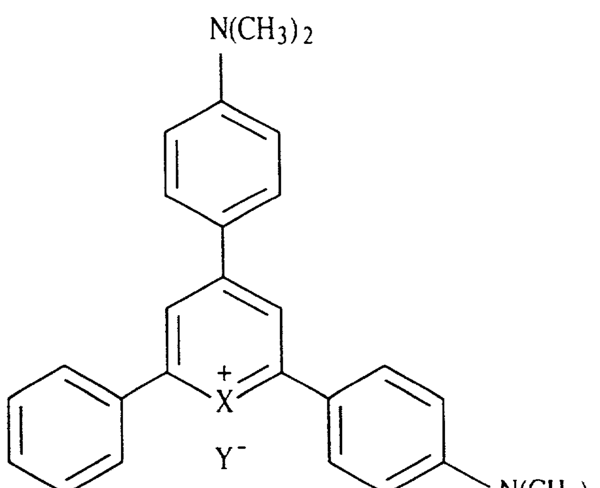


[11],

wherein X is O, S, Se, or Te, and Y^- is an anion.

23. The process according to Claim 22, wherein X is O or S, and Y is I or ClO_4.

24. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [12]:

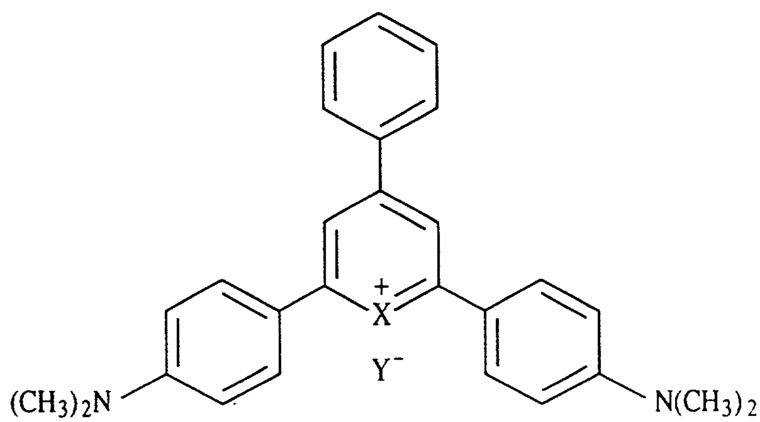


[12],

wherein X is O, S, Se, or Te, and Y- is an anion.

25. The process according to Claim 24, wherein X is O or S, and Y is I or ClO_4.

26. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [13]:

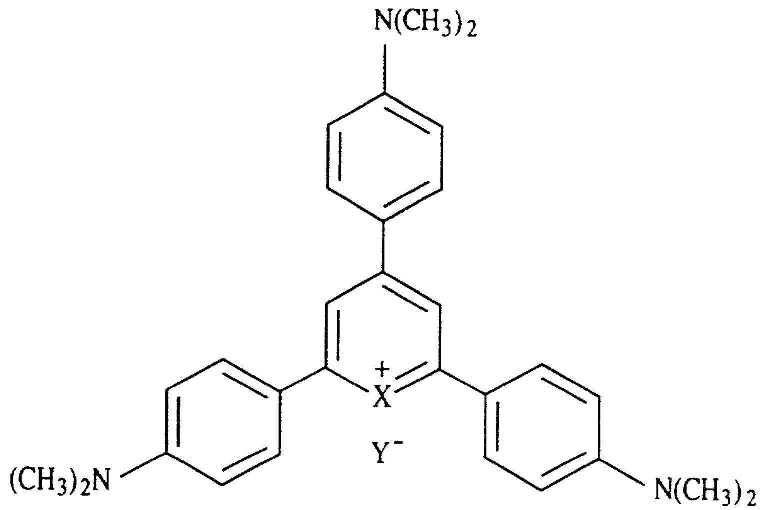


[13],

wherein X is O, S, Se, or Te, and Y- is an anion.

27. The process according to Claim 26, wherein X is O or S, and Y is I or ClO_4.

28. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [14]:

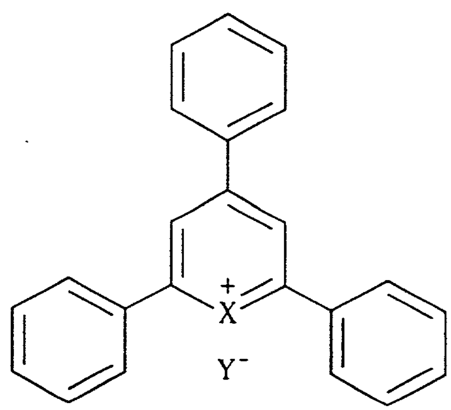


[14],

wherein X is O, S, Se, or Te, and Y^- is an anion.

29. The process according to Claim 28, wherein X is O or S, and Y is I or ClO_4.

30. The process according to Claim 12, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [15]:



[15],

wherein X is O, S, Se, or Te, and Y^- is an anion.

31. The process according to Claim 30, wherein X is O or S, and Y is I or ClO_4.

32. The process according to Claim 12, wherein at least one hydrophilic group is introduced into at least one substituent of said pyrylium compound.

33. The process according to Claim 1, wherein said chemiluminescent compound is inserted into said double-stranded nucleic acid by groove binding.

34. The process according to Claim 1, wherein said luminescence-detecting step includes allowing said chemiluminescent compound and said double-stranded nucleic acid to coexist with an oxalic ester and hydrogen peroxide.

35. The process according to Claim 34, wherein said oxalic ester is bisdinitrophenyl oxalate.

36. The process according to Claim 1, wherein said step of forming a double-stranded nucleic acid includes immobilizing said target nucleic acid or said probe nucleic acid to a solid phase previous to hybridizing said target nucleic acid with said probe nucleic acid.

37. The process according to Claim 1, wherein said step of forming a double-stranded nucleic acid includes the steps of:

immobilizing said target nucleic acid to a solid phase;

preparing as said probe nucleic acid, a single-stranded nucleic acid capable of binding with said target nucleic acid through complementary sequences at 3'-end regions of the target nucleic acid and the single-stranded nucleic acid;

hybridizing said target nucleic acid with said probe nucleic acid to form a double-stranded nucleic acid; and

polymerizing nucleotides to the 3'-ends of said target nucleic acid and said probe nucleic acid by extension reaction to extend a double-stranded portion in said double-stranded nucleic acid.

38. The process according to Claim 1, wherein said step of forming a double-stranded nucleic acid includes the steps of:

preparing as said probe nucleic acid, a single-stranded nucleic acid capable of binding with said target nucleic acid through complementary sequences at 3'-end regions of the target nucleic acid and the single-stranded nucleic acid;

immobilizing said probe nucleic acid to a solid phase;

hybridizing said target nucleic acid with said probe nucleic acid to form a double-stranded nucleic acid; and

polymerizing nucleotides to the 3'-ends of said target nucleic acid and said probe nucleic acid by extension reaction to extend a double-stranded portion in said double-stranded nucleic acid.

39. The process according to Claim 36, 37 or 38, wherein said solid phase comprises a plastic plate.

40. The process according to Claim 1, wherein said target nucleic acid is DNA or RNA.

41. The process according to Claim 40, wherein said DNA is cDNA.

42. The process according to Claim 40, wherein said RNA is mRNA, tRNA or rRNA.

43. The process according to Claim 1, wherein said probe nucleic acid is DNA or RNA.

44. The process according to Claim 1, wherein said target nucleic acid is mRNA comprising a base sequence

corresponding to oligoriboadenylic acid at 3'-end region thereof, and said probe nucleic acid comprises a base sequence corresponding to oligodeoxyribothymidylic acid or polydeoxyribothymidylic acid, the base sequence relating to hybridization with said target nucleic acid.

45. A process for quantifying a target single-stranded nucleic acid having a first base sequence, said process comprising the steps of:

forming a double-stranded nucleic acid by hybridizing said target single-stranded nucleic acid with a probe nucleic acid having a second base sequence complementary to said first base sequence;

providing a chemiluminescent compound capable of being associated with a double-stranded nucleic acid, and then associating said chemiluminescent compound with the double-stranded nucleic acid resulting from said forming step; and

measuring luminescence from said chemiluminescent compound associated with said double-stranded nucleic acid.

46. The process according to Claim 45, wherein the luminescence-measuring step is conducted under a condition that only said chemiluminescent compound associated with said double-stranded nucleic acid can exhibit chemiluminescence.

47. The process according to Claim 46, wherein said condition is in an aqueous medium in which said chemiluminescent compound non-associated with a double-stranded nucleic acid does not exhibit chemiluminescence.

48. The process according to Claim 47, wherein said aqueous medium is water.

49. The process according to Claim 47, wherein said aqueous medium is an aqueous buffer solution.

50. The process according to Claim 47, wherein said aqueous medium is a mixture solution of water and an organic solvent miscible with water.

51. The process according to Claim 50, wherein said organic solvent comprises at least one solvent selected from the group consisting of methanol, ethanol, acetonitrile, dimethylformamide, dimethylsulfoxide, and isopropanol.

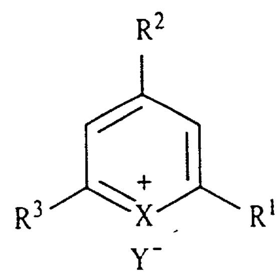
52. The process according to Claim 50, wherein said mixture solution has a content of said organic solvent falling within 2 to 50% by volume relative to water.

53. The process according to Claim 52, wherein said content falls within 5 to 20% by volume relative to water.

54. The process according to Claim 47, wherein pH of said aqueous medium ranges from 5 to 8.

55. The process according to Claim 45, wherein said chemiluminescent compound is capable of being inserted into the double helical structure of said double-stranded nucleic acid as an intercalator.

56. The process according to Claim 55, wherein said chemiluminescent compound is a pyrylium compound represented by the following formula [1]:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or unsubstituted aryl group;

the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl

group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene group, or $-CH=R^4-$, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or $-CH=R^5$, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

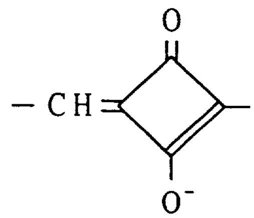
Y^- is an anion.

57. The process according to Claim 56, wherein L in said formula [1] is any one of the groups represented by the following formulae [2] to [6], respectively:

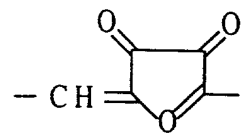
$$\begin{array}{l} -CH=\underset{\displaystyle Z}{\underset{|}{C}}-(CH=CH)n- \end{array} \qquad [2];$$

$$-\phi-(CH=CH)n- \qquad [3];$$

$$-CH=CH-\phi-CH=CH- \qquad [4];$$



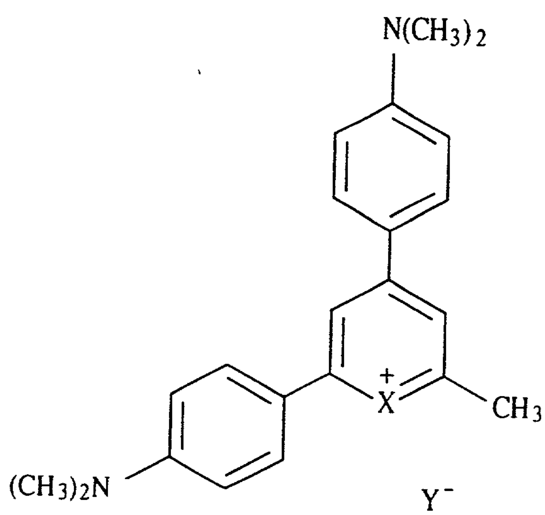
[5]; and



[6],

wherein Z is a hydrogen atom or a substituted or unsubstituted lower alkyl group, n is 0, 1 or 2, and ϕ is a substituted or unsubstituted o-, m- or p-phenylene group.

58. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [7]:

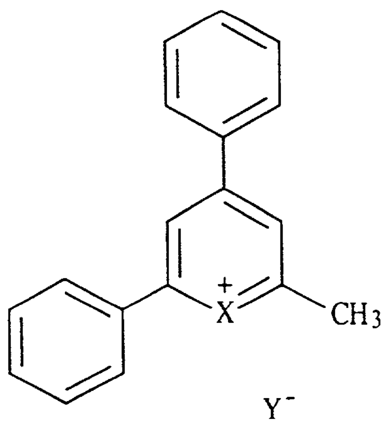


[7],

wherein X is O, S, Se, or Te, and Y- is an anion.

59. The process according to Claim 58, wherein X is O or S, and Y is I or ClO_4.

60. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [8]:

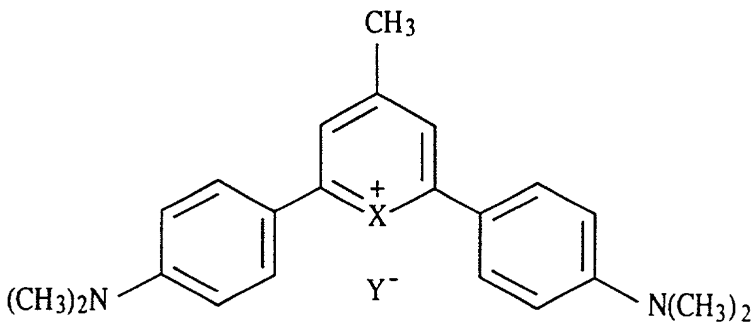


[8],

wherein X is O, S, Se, or Te, and Y^- is an anion.

61. The process according to Claim 60, wherein X is O or S, and Y is I or ClO_4.

62. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [9]:

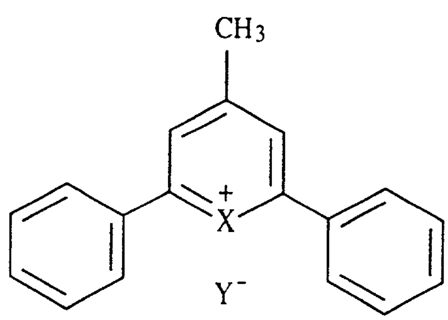


[9],

wherein X is O, S, Se, or Te, and Y^- is an anion.

63. The process according to Claim 62, wherein X is O or S, and Y is I or ClO_4.

64. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [10]:

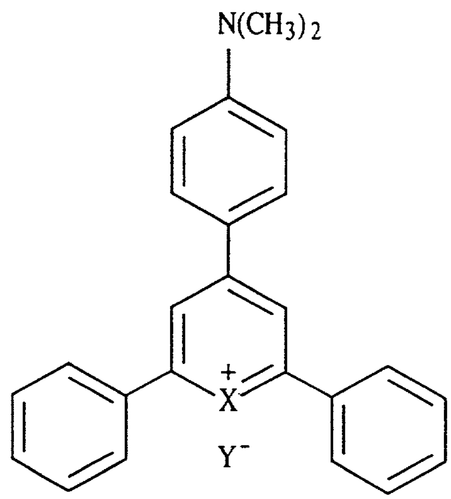


[10],

wherein X is O, S, Se, or Te, and Y^- is an anion.

65. The process according to Claim 64, wherein X is O or S, and Y is I or ClO_4.

66. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [11]:

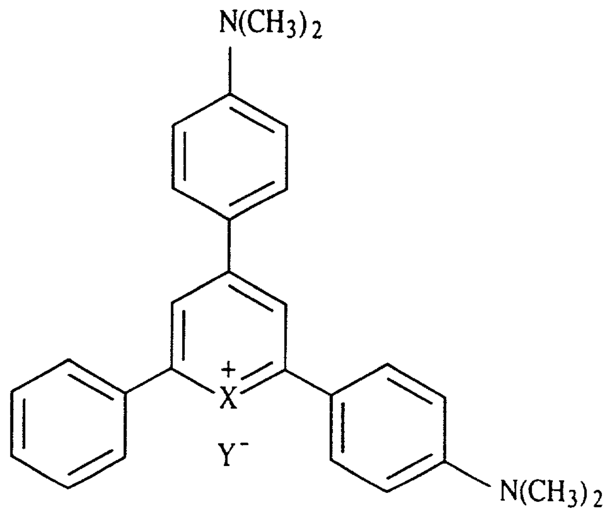


[11],

wherein X is O, S, Se, or Te, and Y^- is an anion.

67. The process according to Claim 66, wherein X is O or S, and Y is I or ClO_4.

68. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [12]:

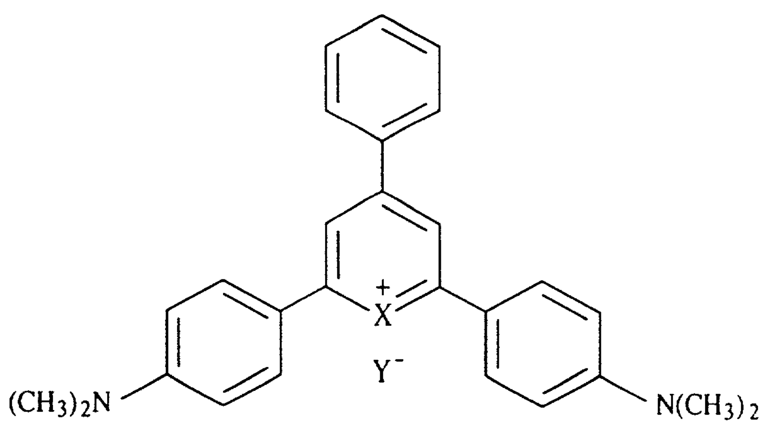


[12],

wherein X is O, S, Se, or Te, and Y- is an anion.

69. The process according to Claim 68, wherein X is O or S, and Y is I or ClO_4.

70. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [13]:

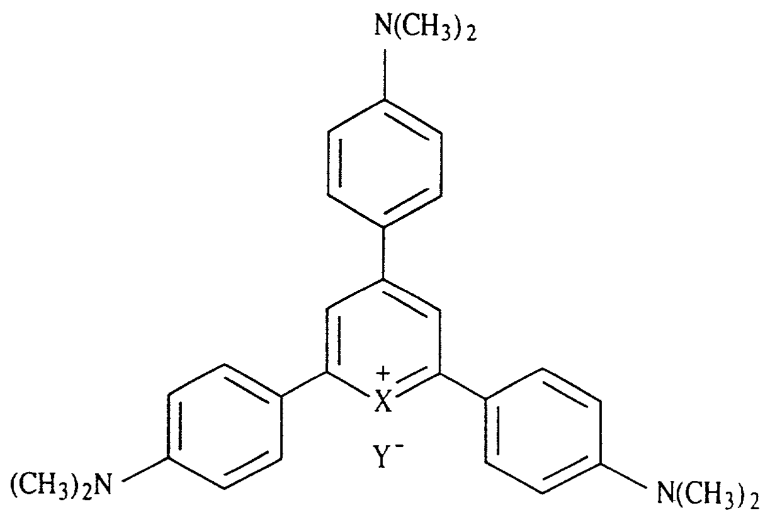


[13],

wherein X is O, S, Se, or Te, and Y- is an anion.

71. The process according to Claim 70, wherein X is O or S, and Y is I or ClO_4.

72. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [14]:

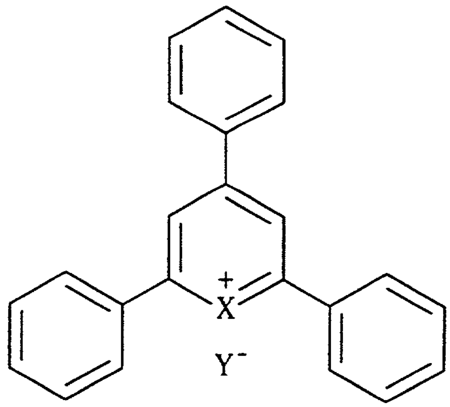


[14],

wherein X is O, S, Se, or Te, and Y- is an anion.

73. The process according to Claim 72, wherein X is O or S, and Y is I or ClO_4.

74. The process according to Claim 56, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [15]:



[15],

wherein X is O, S, Se, or Te, and Y- is an anion.

75. The process according to Claim 74, wherein X is O or S, and Y is I or ClO_4.

76. The process according to Claim 56, wherein at least one hydrophilic group is introduced into at least one substituent of said pyrylium compound.

77. The process according to Claim 45, wherein said chemiluminescent compound is inserted into said double-stranded nucleic acid by groove binding.

78. The process according to Claim 45, wherein said luminescence-measuring step includes allowing said chemiluminescent compound and said double-stranded nucleic acid to coexist with an oxalic ester and hydrogen peroxide.

79. The process according to Claim 78, wherein said oxalic ester is bisdinitrophenyl oxalate.

80. The process according to Claim 45, wherein said step of forming a double-stranded nucleic acid includes immobilizing said target nucleic acid or said probe nucleic acid to a solid phase previous to hybridizing said target nucleic acid with said probe nucleic acid.

81. The process according to Claim 45, wherein said step of forming a double-stranded nucleic acid includes the steps of:

immobilizing said target nucleic acid to a solid phase;

preparing as said probe nucleic acid, a single-stranded nucleic acid capable of binding with said target nucleic acid through complementary sequences at 3′-end regions of the target nucleic acid and the single-stranded nucleic acid;

hybridizing said target nucleic acid with said probe nucleic acid to form a double-stranded nucleic acid; and

polymerizing nucleotides to the 3′-ends of said target nucleic acid and said probe nucleic acid by extension reaction to extend a double-stranded portion in said double-stranded nucleic acid.

82. The process according to Claim 45, wherein said step of forming a double-stranded nucleic acid includes the steps of:

preparing as said probe nucleic acid, a single-stranded nucleic acid capable of binding with said target nucleic acid through complementary sequences at 3'-end regions of the target nucleic acid and the single-stranded nucleic acid;

immobilizing said probe nucleic acid to a solid phase;

hybridizing said target nucleic acid with said probe nucleic acid to form a double-stranded nucleic acid; and

polymerizing nucleotides to the 3'-ends of said target nucleic acid and said probe nucleic acid by extension reaction to extend a double-stranded portion in said double-stranded nucleic acid.

83. The process according to Claim 80, 81 or 82, wherein said solid phase comprises a plastic plate.

84. The process according to Claim 45, wherein said target nucleic acid is DNA or RNA.

85. The process according to Claim 84, wherein said DNA is cDNA.

86. The process according to Claim 84, wherein said RNA is mRNA, tRNA or rRNA.

87. The process according to Claim 45, wherein said probe nucleic acid is DNA or RNA.

88. The process according to Claim 45, wherein said target nucleic acid is mRNA comprising a base sequence corresponding to oligoriboadenylic acid at 3'-end region thereof, and said probe nucleic acid comprises a base sequence corresponding to oligodeoxyribothymidylic acid or polydeoxyribothymidylic acid, the base sequence relating to hybridization with said target nucleic acid.

89. A process for detecting a target double-stranded nucleic acid comprising the steps of:

providing a chemiluminescent compound capable of being associated with a double-stranded nucleic acid, and then associating said chemiluminescent compound with the target double-stranded nucleic acid; and

detecting luminescence from said chemiluminescent compound associated with said target double-stranded nucleic acid.

90. The process according to Claim 89, wherein the

luminescence-detecting step is conducted under a condition that only said chemiluminescent compound associated with said double-stranded nucleic acid can exhibit chemiluminescence.

91. The process according to Claim 90, wherein said condition is in an aqueous medium in which said chemiluminescent compound non-associated with a double-stranded nucleic acid does not exhibit chemiluminescence.

92. The process according to Claim 91, wherein said aqueous medium is water.

93. The process according to Claim 91, wherein said aqueous medium is an aqueous buffer solution.

94. The process according to Claim 91, wherein said aqueous medium is a mixture solution of water and an organic solvent miscible with water.

95. The process according to Claim 94, wherein said organic solvent comprises at least one solvent selected from the group consisting of methanol, ethanol, acetonitrile, dimethylformamide, dimethylsulfoxide, and isopropanol.

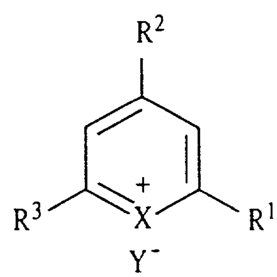
96. The process according to Claim 94, wherein said mixture solution has a content of said organic solvent falling within 2 to 50% by volume relative to water.

97. The process according to Claim 96, wherein said content falls within 5 to 20% by volume relative to water.

98. The process according to Claim 91, wherein pH of said aqueous medium ranges from 5 to 8.

99. The process according to Claim 89, wherein said chemiluminescent compound is capable of being inserted into the double helical structure of said double-stranded nucleic acid as an intercalator.

100. The process according to Claim 99, wherein said chemiluminescent compound is a pyrylium compound represented by the following formula [1]:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or unsubstituted aryl group;

the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene group, or $-CH=R^4-$, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or $-CH=R^5$, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

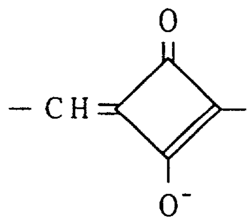
Y^- is an anion.

101. The process according to Claim 100, wherein L in said formula [1] is any one of the groups represented by the following formulae [2] to [6], respectively:

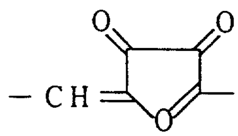
$$-CH=\underset{\displaystyle Z}{\underset{|}{C}}-(CH=CH)n- \qquad [2];$$

$-\phi-(CH=CH)n-$ [3];

$-CH=CH-\phi-CH=CH-$ [4];



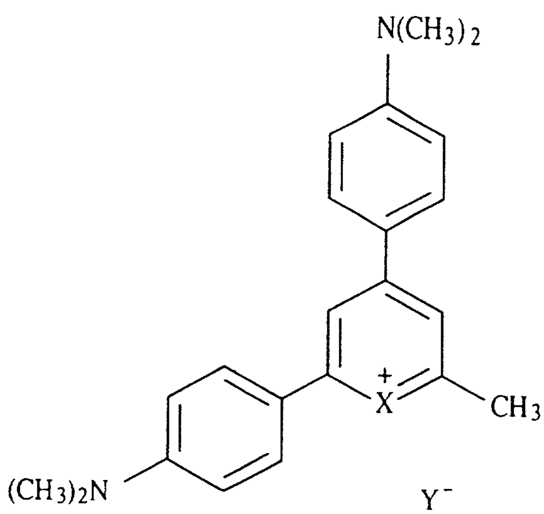
[5]; and



[6],

wherein Z is a hydrogen atom or a substituted or unsubstituted lower alkyl group, n is 0, 1 or 2, and ϕ is a substituted or unsubstituted o-, m- or p-phenylene group.

102. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [7]:

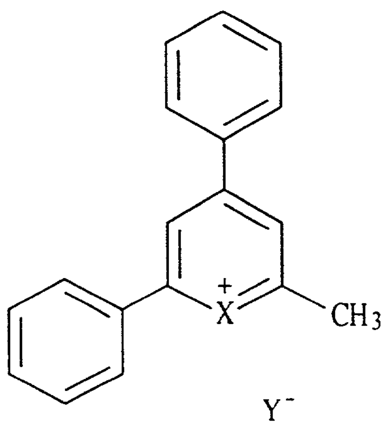


[7],

wherein X is O, S, Se, or Te, and Y- is an anion.

103. The process according to Claim 102, wherein X is O or S, and Y is I or ClO_4.

104. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [8]:

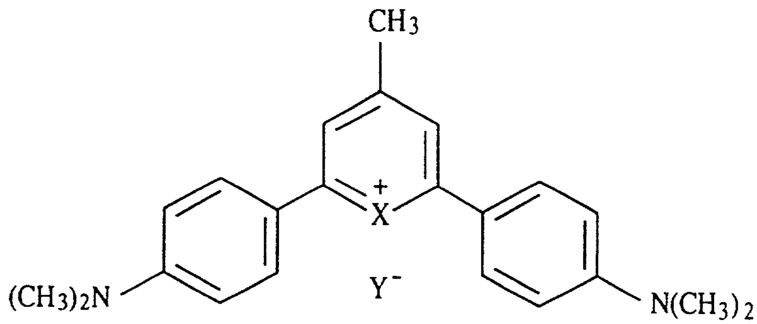


[8],

wherein X is O, S, Se, or Te, and Y- is an anion.

105. The process according to Claim 104, wherein X is O or S, and Y is I or ClO_4.

106. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [9]:

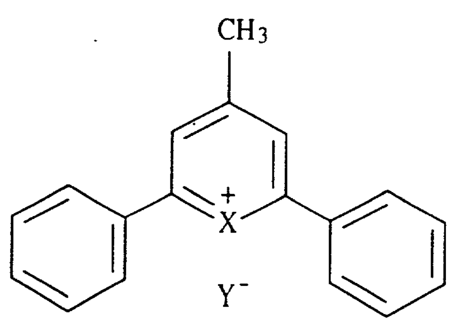


[9],

wherein X is O, S, Se, or Te, and Y- is an anion.

107. The process according to Claim 106, wherein X is O or S, and Y is I or ClO_4.

108. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [10]:

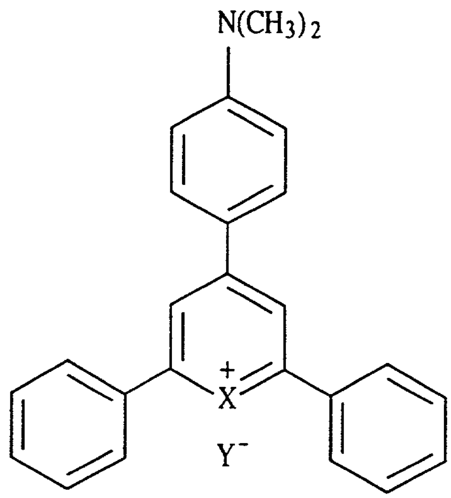


[10],

wherein X is O, S, Se, or Te, and Y- is an anion.

109. The process according to Claim 108, wherein X is O or S, and Y is I or ClO_4.

110. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [11]:

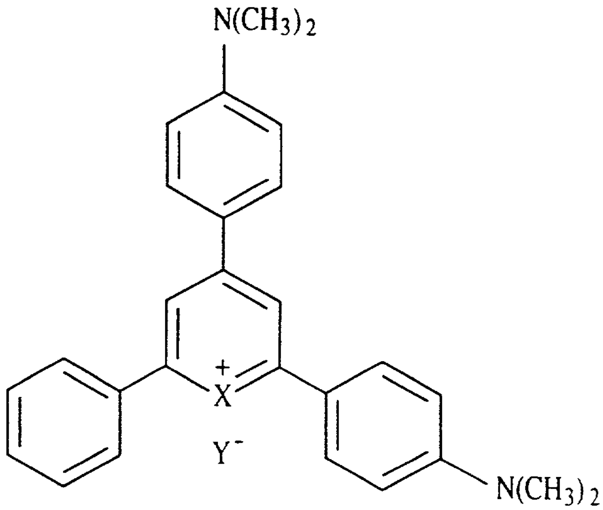


[11],

wherein X is O, S, Se, or Te, and Y^- is an anion.

111. The process according to Claim 110, wherein X is O or S, and Y is I or ClO_4.

112. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [12]:

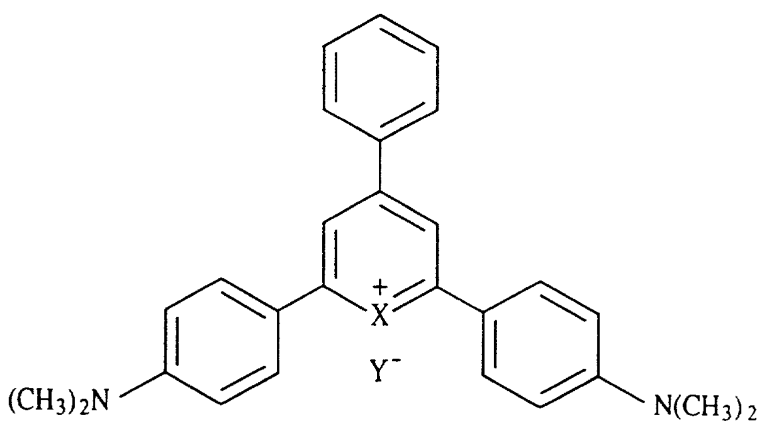


[12],

wherein X is O, S, Se, or Te, and Y- is an anion.

113. The process according to Claim 112, wherein X is O or S, and Y is I or ClO_4.

114. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [13]:

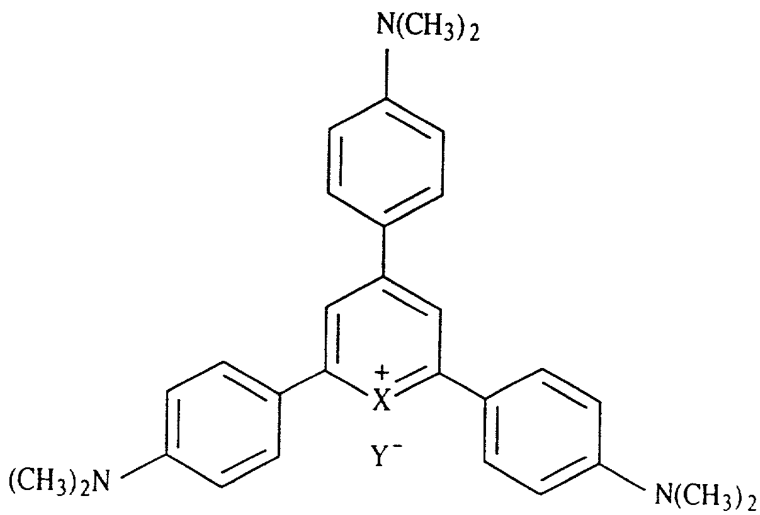


[13],

wherein X is O, S, Se, or Te, and Y^- is an anion.

115. The process according to Claim 114, wherein X is O or S, and Y is I or ClO_4.

116. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [14]:

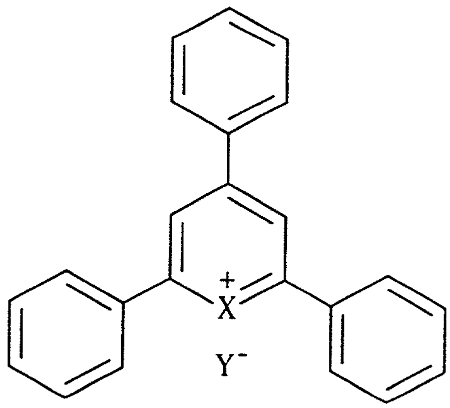


[14],

wherein X is O, S, Se, or Te, and Y^- is an anion.

117. The process according to Claim 116, wherein X is O or S, and Y is I or ClO_4.

118. The process according to Claim 100, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [15]:



[15],

wherein X is O, S, Se, or Te, and Y- is an anion.

119. The process according to Claim 118, wherein X is O or S, and Y is I or ClO_4.

120. The process according to Claim 100, wherein at least one hydrophilic group is introduced into at least one substituent of said pyrylium compound.

121. The process according to Claim 89, wherein said luminescence-detecting step includes allowing said chemiluminescent compound and said double-stranded nucleic acid to coexist with an oxalic ester and hydrogen peroxide.

122. The process according to Claim 121, wherein said oxalic ester is bisdinitrophenyl oxalate.

123. The process according to Claim 89, wherein said

chemiluminescent compound is inserted into said double-stranded nucleic acid by groove binding.

124. A process for quantifying a target double-stranded nucleic acid comprising the steps of:

providing a chemiluminescent compound capable of being associated with a double-stranded nucleic acid, and then associating said chemiluminescent compound with the target double-stranded nucleic acid; and

measuring luminescence from said chemiluminescent compound associated with said target double-stranded nucleic acid.

125. The process according to Claim 124, wherein the luminescence-measuring step is conducted under a condition that only said chemiluminescent compound associated with said double-stranded nucleic acid can exhibit chemiluminescence.

126. The process according to Claim 125, wherein said condition is in an aqueous medium in which said chemiluminescent compound non-associated with a double-stranded nucleic acid does not exhibit chemiluminescence.

127. The process according to Claim 126, wherein said

aqueous medium is water.

128. The process according to Claim 126, wherein said aqueous medium is an aqueous buffer solution.

129. The process according to Claim 126, wherein said aqueous medium is a mixture solution of water and an organic solvent miscible with water.

130. The process according to Claim 129, wherein said organic solvent comprises at least one solvent selected from the group consisting of methanol, ethanol, acetonitrile, dimethylformamide, dimethylsulfoxide, and isopropanol.

131. The process according to Claim 129, wherein said mixture solution has a content of said organic solvent falling within 2 to 50% by volume relative to water.

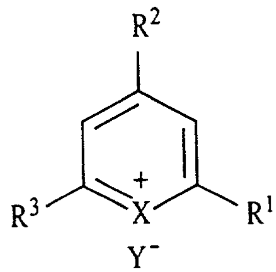
132. The process according to Claim 131, wherein said content falls within 5 to 20% by volume relative to water.

133. The process according to Claim 126, wherein pH of said aqueous medium ranges from 5 to 8.

134. The process according to Claim 124, wherein said

chemiluminescent compound is capable of being inserted into the double helical structure of said double-stranded nucleic acid as an intercalator.

135. The process according to Claim 134, wherein said chemiluminescent compound is a pyrylium compound represented by the following formula [1]:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or unsubstituted aryl group;

the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene

group, or -CH=R^4-, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or -CH=R^5, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

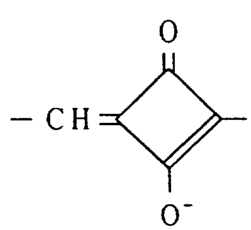
Y^- is an anion.

136. The process according to Claim 135, wherein L in said formula [1] is any one of the groups represented by the following formulae [2] to [6], respectively:

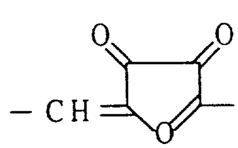
$$\begin{array}{l} -CH=\underset{\displaystyle Z}{\underset{|}{C}}-(CH=CH)n- \end{array} \qquad [2];$$

$$-\phi-(CH=CH)n- \qquad [3];$$

$$-CH=CH-\phi-CH=CH- \qquad [4];$$



[5]; and

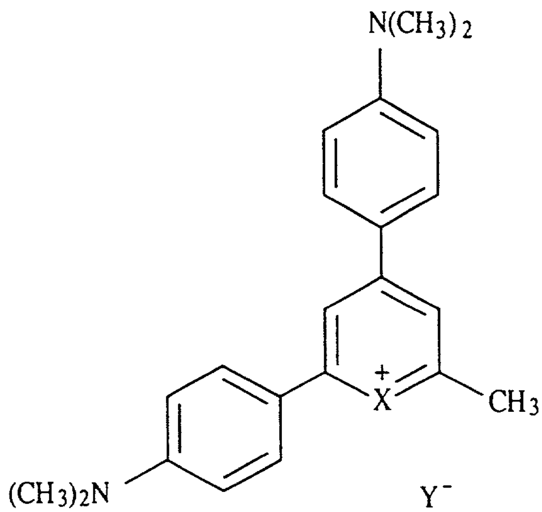


[6],

wherein Z is a hydrogen atom or a substituted or unsubstituted lower alkyl group, n is 0, 1 or 2, and ϕ is a

substituted or unsubstituted o-, m- or p-phenylene group.

137. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [7]:

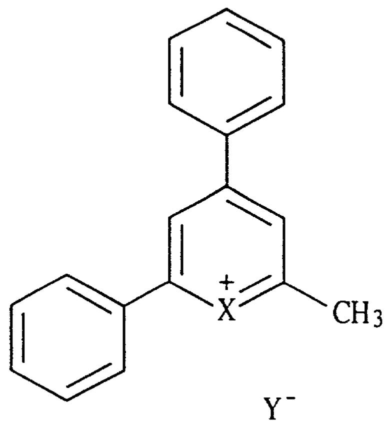


[7],

wherein X is O, S, Se, or Te, and Y^- is an anion.

138. The process according to Claim 137, wherein X is O or S, and Y is I or ClO_4.

139. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [8]:

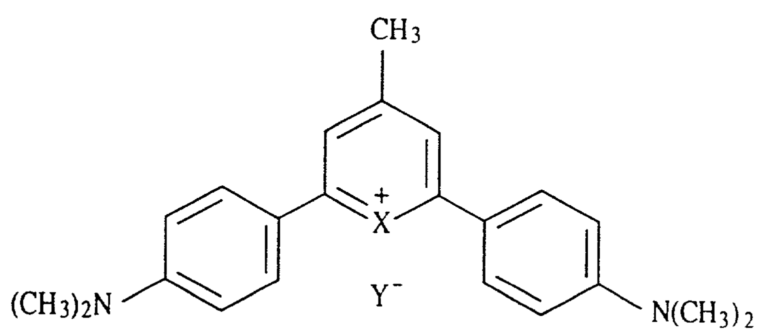


[8],

wherein X is O, S, Se, or Te, and Y^- is an anion.

140. The process according to Claim 139, wherein X is O or S, and Y is I or ClO_4.

141. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [9]:

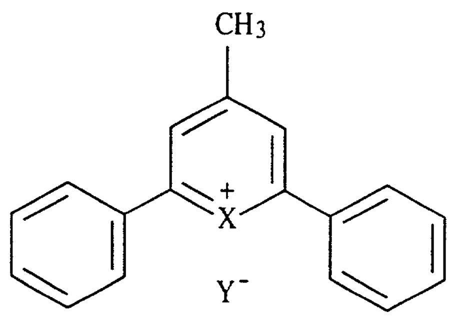


[9],

wherein X is O, S, Se, or Te, and Y^- is an anion.

142. The process according to Claim 141, wherein X is O or S, and Y is I or ClO_4.

143. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is a compound represented by the following formula [10]:

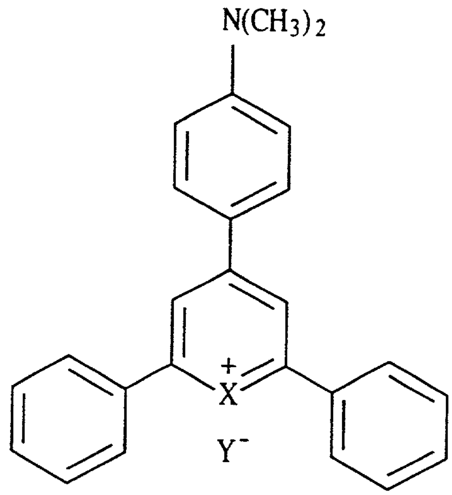


[10],

wherein X is O, S, Se, or Te, and Y^- is an anion.

144. The process according to Claim 143, wherein X is O or S, and Y is I or ClO_4.

145. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [11]:

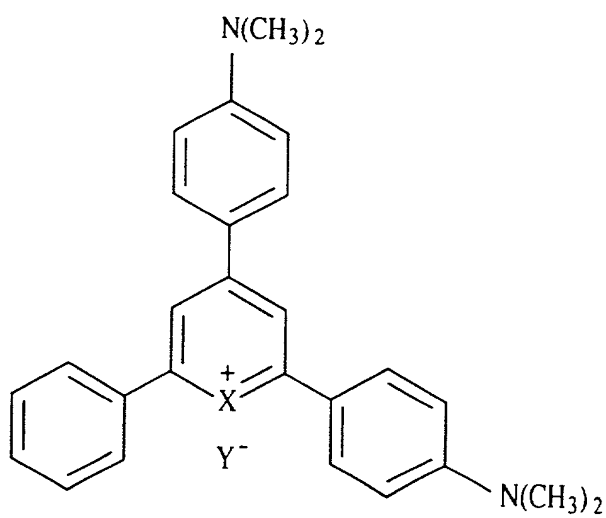


[11],

wherein X is O, S, Se, or Te, and Y^- is an anion.

146. The process according to Claim 145, wherein X is O or S, and Y is I or ClO_4.

147. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [12]:

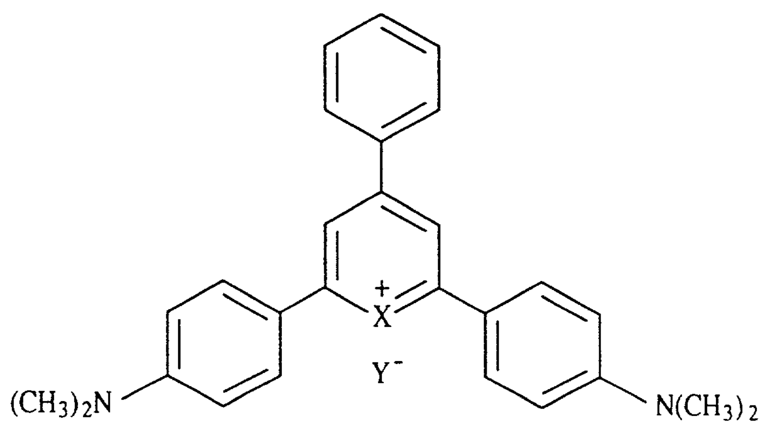


[12],

wherein X is O, S, Se, or Te, and Y^- is an anion.

148. The process according to Claim 147, wherein X is O or S, and Y is I or ClO_4.

149. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [13]:

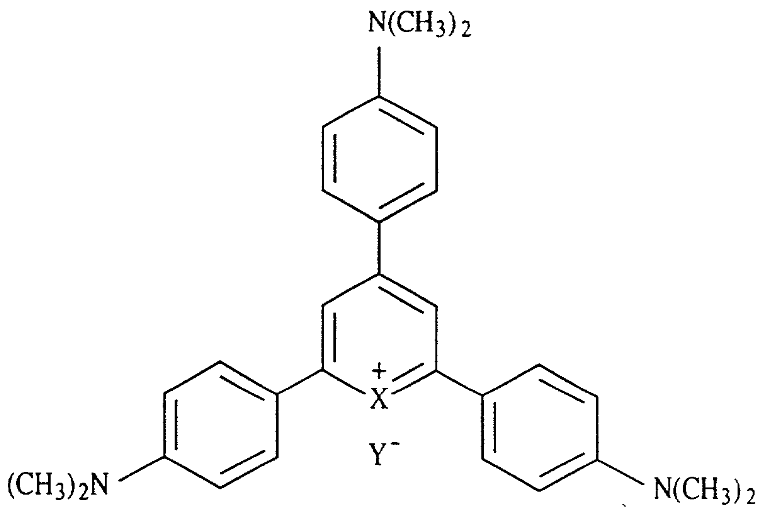


[13],

wherein X is O, S, Se, or Te, and Y^- is an anion.

150. The process according to Claim 149, wherein X is O or S, and Y is I or ClO_4.

151. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [14]:

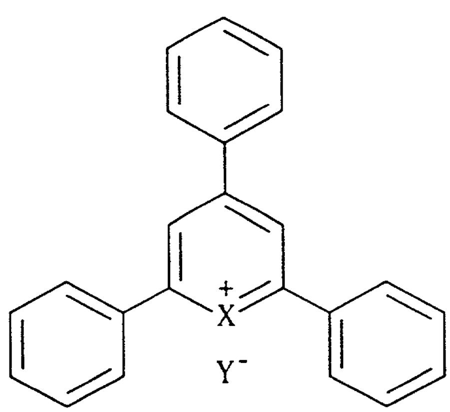


[14],

wherein X is O, S, Se, or Te, and Y^- is an anion.

152. The process according to Claim 151, wherein X is O or S, and Y is I or ClO_4.

153. The process according to Claim 135, wherein said chemiluminescent compound represented by said formula [1] is the compound represented by the following formula [15]:



[15],

wherein X is O, S, Se, or Te, and Y^- is an anion.

154. The process according to Claim 153, wherein X is O or S, and Y is I or ClO_4.

155. The process according to Claim 135, wherein at least one hydrophilic group is introduced into at least one substituent of said pyrylium compound.

156. The process according to Claim 124, wherein said luminescence-measuring step includes allowing said chemiluminescent compound and said double-stranded nucleic acid to coexist with an oxalic ester and hydrogen peroxide.

157. The process according to Claim 156, wherein said oxalic ester is bisdinitrophenyl oxalate.

158. The process according to Claim 124, wherein said chemiluminescent compound is inserted into said double-stranded nucleic acid by groove binding.

159. A process for detecting a target single-stranded nucleic acid having a first base sequence, said process comprising the steps of:

forming a double-stranded nucleic acid by hybridizing said target single-stranded nucleic acid with a probe

nucleic acid having a second base sequence complementary to said first base sequence;

providing a compound which can be intercalated into a double-stranded nucleic acid and which is capable of exhibiting chemiluminescence only in a hydrophobic condition, and then intercalating said compound into the double-stranded nucleic acid resulting from said forming step; and

placing in an aqueous medium said double-stranded nucleic acid into which said compound is intercalated together with a reagent capable of causing said compound to exhibit chemiluminescence, and detecting the resulting chemiluminescence.

160. A process for quantifying a target single-stranded nucleic acid having a first base sequence, said process comprising the steps of:

forming a double-stranded nucleic acid by hybridizing said target single-stranded nucleic acid with a probe nucleic acid having a second base sequence complementary to said first base sequence;

providing a compound which can be intercalated into a double-stranded nucleic acid and which is capable of exhibiting chemiluminescence only in a hydrophobic condition, and then intercalating said compound into the double-stranded nucleic acid resulting from said forming step;

double-stranded nucleic acid resulting from said forming step; and

placing in an aqueous medium said double-stranded nucleic acid into which said compound is intercalated together with a reagent capable of causing said compound to exhibit chemiluminescence, and measuring the resulting chemiluminescence.

161. A process for detecting a target double-stranded nucleic acid comprising the steps of:

providing a compound which can be intercalated into a double-stranded nucleic acid and which is capable of exhibiting substantial chemiluminescence only in a hydrophobic condition, and then intercalating said compound into said target double-stranded nucleic acid; and

placing in an aqueous medium said double-stranded nucleic acid into which said compound is intercalated together with a reagent capable of causing said compound to exhibit chemiluminescence, and detecting the resulting chemiluminescence.

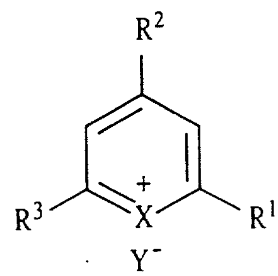
162. A process for quantifying a target double-stranded nucleic acid comprising the steps of:

providing a compound which can be intercalated into a double-stranded nucleic acid and which is capable of

exhibiting substantial chemiluminescence only in a hydrophobic condition, and then intercalating said compound into said target double-stranded nucleic acid; and

placing in an aqueous medium said double-stranded nucleic acid into which said compound is intercalated together with a reagent capable of causing said compound to exhibit chemiluminescence, and measuring the resulting chemiluminescence.

163. The detecting process according to Claim 159 or 161, wherein said compound is a pyrylium compound represented by the following formula [1]:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or unsubstituted aryl group;

the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted

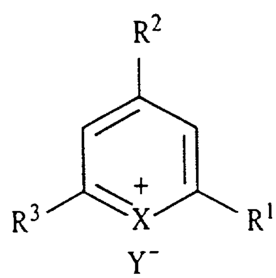
cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene group, or $-CH=R^4-$, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or $-CH=R^5$, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

Y^- is an anion.

164. The quantifying process according to Claim 160 or 162, wherein said compound is a pyrylium compound represented by the following formula [1]:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or

unsubstituted aryl group;

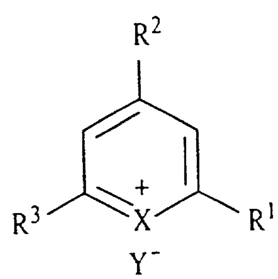
the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene group, or $-CH=R^4-$, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or $-CH=R^5$, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

Y^- is an anion.

165. A pyrylium compound represented by the following formula [1] for use in chemiluminescence analysis:



[1],

wherein:

X is O, S, Se or Te;

two of R^1, R^2 and R^3 are independently a substituted or unsubstituted aryl group;

the other is a hydrogen atom, halogen atom, sulfonate group, amino group, styryl group, nitro group, hydroxyl group, carboxyl group, cyano group, substituted or unsubstituted alkyl group, substituted or unsubstituted cycloalkyl group, -A or -L-A, wherein:

L is $-L^1-$, $-L^2-L^3-$ or $-L^4-L^5-L^6-$, wherein each of L^1 to L^6 is independently -(CH=CH)-, a divalent group derived from the substituted or unsubstituted aryl group, a substituted or unsubstituted lower alkylene group, or $-CH=R^4-$, wherein R^4 is a ring structure having an oxo group; and

A is a substituted or unsubstituted aryl group, or $-CH=R^5$, wherein R^5 is a substituted or unsubstituted heterocyclic ring, substituted or unsubstituted cycloalkyl group or substituted or unsubstituted aromatic ring; and

Y^- is an anion.

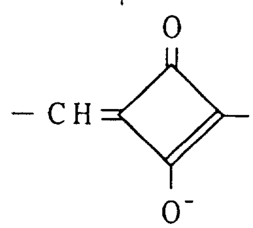
166. The pyrylium compound according to Claim 165, wherein L in said formula [1] is any one of the groups represented by the following formulae [2] to [6],

respectively:

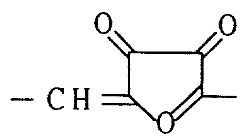
$$-CH=\underset{\displaystyle Z}{\underset{|}{C}}-(CH=CH)_n- \qquad [2];$$

$$-\phi-(CH=CH)_n- \qquad [3];$$

$$-CH=CH-\phi-CH=CH- \qquad [4];$$



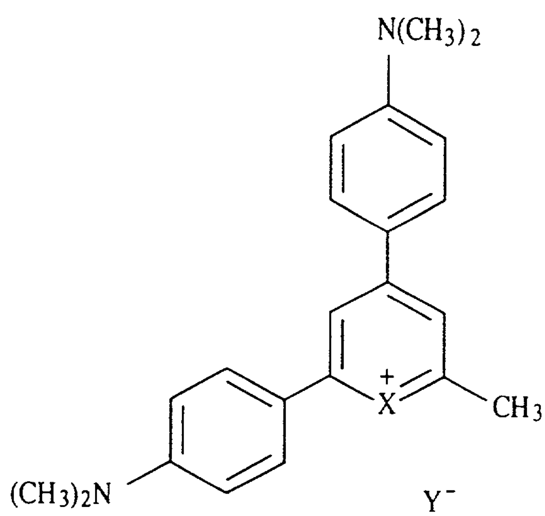
[5]; and



[6],

wherein Z is a hydrogen atom or a substituted or unsubstituted lower alkyl group, n is 0, 1 or 2, and ϕ is a substituted or unsubstituted o-, m- or p-phenylene group.

167. The pyrylium compound according to Claim 165, represented by the following formula [7]:

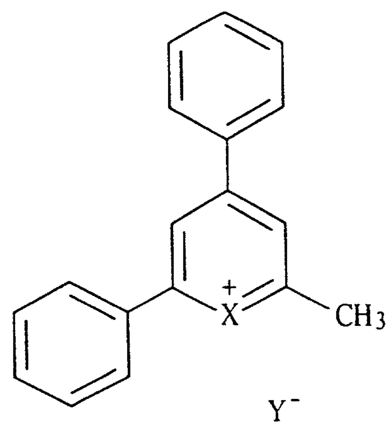


[7],

wherein X is O, S, Se, or Te, and Y^- is an anion.

168. The pyrylium compound according to Claim 167, wherein X is O or S, and Y is I or ClO_4.

169. The pyrylium compound according to Claim 165, represented by the following formula [8]:

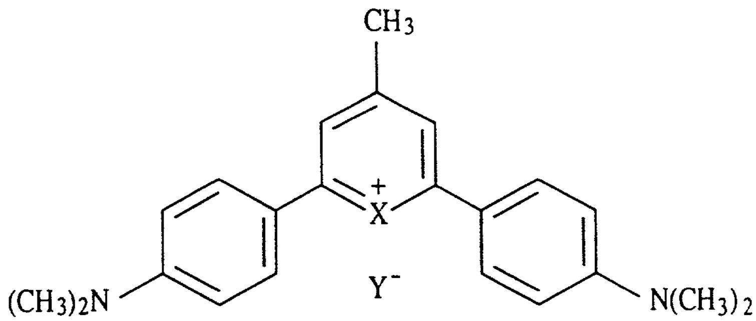


[8],

wherein X is O, S, Se, or Te, and Y^- is an anion.

170. The pyrylium compound according to Claim 169, wherein X is O or S, and Y is I or ClO_4.

171. The pyrylium compound according to Claim 165, represented by the following formula [9]:

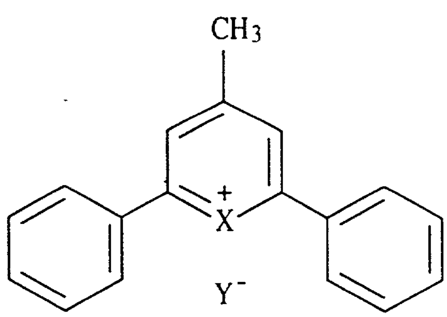


[9],

wherein X is O, S, Se, or Te, and Y- is an anion.

172. The pyrylium compound according to Claim 171, wherein X is O or S, and Y is I or ClO_4.

173. The pyrylium compound according to Claim 165, represented by the following formula [10]:



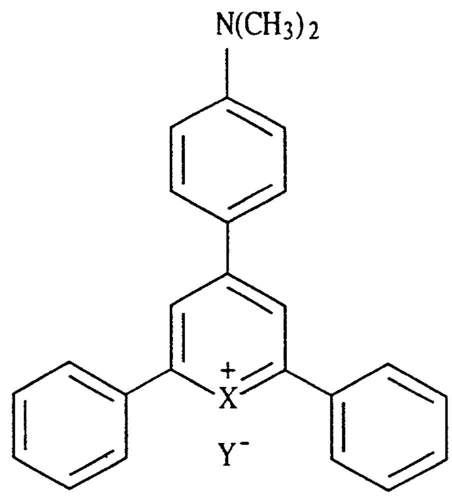
[10],

wherein X is O, S, Se, or Te, and Y- is an anion.

174. The pyrylium compound according to Claim 173, wherein X is O or S, and Y is I or ClO_4.

175. The pyrylium compound according to Claim 165,

represented by the following formula [11]:

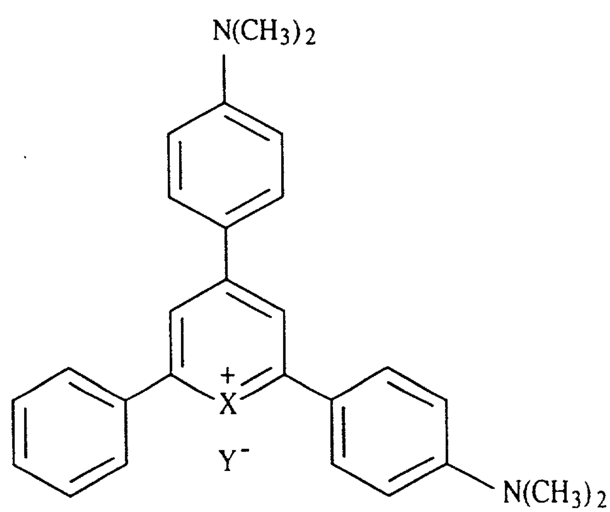


[11],

wherein X is O, S, Se, or Te, and Y^- is an anion.

176. The pyrylium compound according to Claim 175, wherein X is O or S, and Y is I or ClO_4.

177. The pyrylium compound according to Claim 165, represented by the following formula [12]:

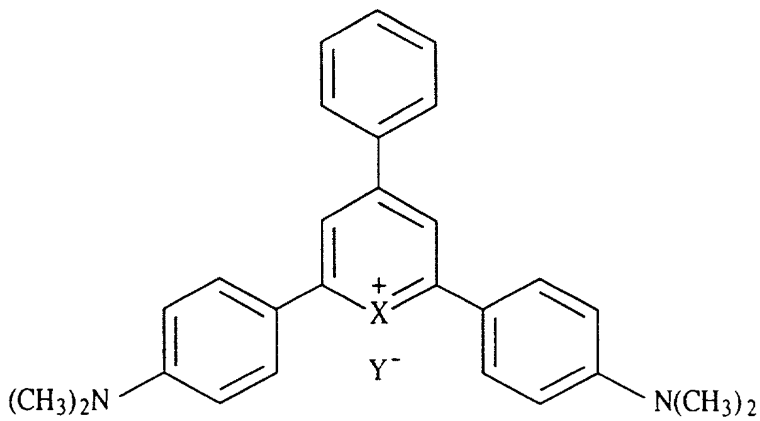


[12],

wherein X is O, S, Se, or Te, and Y^- is an anion.

178. The pyrylium compound according to Claim 177, wherein X is O or S, and Y is I or ClO_4.

179. The pyrylium compound according to Claim 165, represented by the following formula [13]:

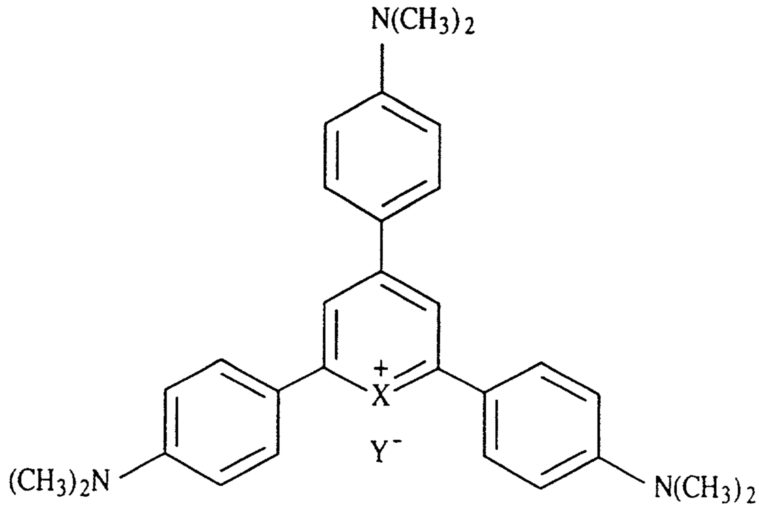


[13],

wherein X is O, S, Se, or Te, and Y^- is an anion.

180. The pyrylium compound according to Claim 179, wherein X is O or S, and Y is I or ClO_4.

181. The pyrylium compound according to Claim 165, represented by the following formula [14]:

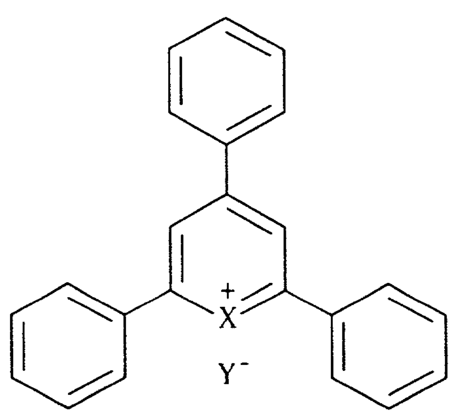


[14],

wherein X is O, S, Se, or Te, and Y- is an anion.

182. The pyrylium compound according to Claim 181, wherein X is O or S, and Y is I or ClO_4.

183. The pyrylium compound according to Claim 165, represented by the following formula [15]:



[15],

wherein X is O, S, Se, or Te, and Y- is an anion.

184. The pyrylium compound according to Claim 183, wherein X is O or S, and Y is I or ClO_4.

185. The pyrylium compound according to Claim 165, wherein at least one hydrophilic group is introduced into at least one substituent of said pyrylium compound.